

NASA Team Simulates a Glimpse of Our Galaxy in Gravitational Waves



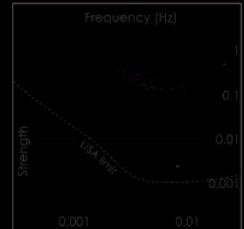
Astronomers using simulated data have produced a glimpse of the sky as it would appear in gravitational waves, cosmic ripples in space-time generated by orbiting objects.

Since 2015, ground-based observatories have detected about a hundred mergers of systems that pair stellar-mass black holes, neutron stars, or both. The signals typically last less than a minute and can appear anywhere in the sky. This all-sky distribution indicates the sources lie far beyond our galaxy.

Binary systems also fill the Milky Way, and astronomers expect many of them to contain compact objects like white dwarfs, neutron stars, and black holes in tight orbits. But to "hear" their gravitational waves requires a space-based observatory because their frequencies are too low for ground-based detectors.

Astronomers expect that future observatories like LISA, which is led by ESA in collaboration with NASA, will detect tens of thousands of these pairs. Using data simulating the expected distribution and gravitational wave signals of these systems, a Goddard team developed a way to combine the data into an all-sky view of our galaxy.

The promise of gravitational waves is that they offer astronomers a chance to observe the universe in a totally different way, perhaps revealing something new about our galaxy.



Watch as gravitational waves from a simulated population of compact binary systems combine into a synthetic map of the entire sky. Such systems contain white dwarfs, neutron stars, or black holes in tight orbits. Maps like this using real data will be possible once space-based gravitational wave observatories become active in the next decade.

Paper: <https://iopscience.iop.org/article/10.3847/1538-3881/acd3f1/meta> Credit: Kaitlyn Szekerczes, Scott Noble, Cecilia Chirenti, James Thorpe

News feature: <https://www.nasa.gov/universe/nasa-team-simulates-a-glimpse-of-our-galaxy-in-gravitational-waves/>